

3472/1  
 Matematik Tambahan  
 Tingkatan 5  
 Ogos/September  
 2010  
 2 Jam

**JABATAN PELAJARAN KELANTAN  
 DENGAN KERJASAMA  
 PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA  
 SEKOLAH MENENGAH MALAYSIA  
 CAWANGAN KELANTAN**

**PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA  
 TAHUN 2010**

**MATEMATIK TAMBAHAN  
 KERTAS 1  
 Masa : Dua Jam**

**JANGAN BUKA BUKU SOALAN INI SEHINGGA  
 DIBERITAHU**

*Arahan:*

1. *Tuliskan **nama** dan **tingkatan** anda pada ruangan yang disediakan.*
2. *Kertas soalan in adalah dalam dwi bahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Malaysia.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Malaysia.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Soalan	Markah Penuh	Markah Diperolehi
1	2	
2	3	
3	4	
4	2	
5	3	
6	4	
7	3	
8	3	
9	2	
10	4	
11	4	
12	4	
13	3	
14	3	
15	2	
16	3	
17	3	
18	4	
19	3	
20	3	
21	4	
22	3	
23	4	
24	3	
25	4	
<b>TOTAL</b>	<b>80</b>	

Kertas soalan ini mengandungi 24 halaman bercetak

Answer **all** questions.

Jawab **semua** soalan.

**1** The following information refer to the set *A* and set *B*.

*Maklumat berikut adalah berkaitan dengan Set A dan Set B.*

Set $A = \{ -3, -2, 2, 3 \}$
------------------------------

The relations between set *A* and set *B* is defined by the set of ordered pairs  $\{(-3, 9) (-2, 4) (2, 4) (3, 9)\}$ .

*Hubungan antara set A dan set B ditakrifkan oleh set pasangan bertertib  $\{(-3, 9) (-2, 4) (2, 4) (3, 9)\}$ .*

(a) State the type of relations.

*Nyatakan jenis hubungan.*

(b) Using the functions notation, write a relation between set *A* and set *B*.

*Dengan menggunakan tatabanda fungsi, tulis satu hubungan antara set A dan set B.*

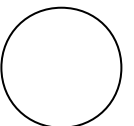
[ 2 marks ]

[ 2 markah ]

Answer / Jawapan ( a ).....

( b ).....

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**SULIT**

For examiner's  
use only

- 2 Given that the functions  $f: x \rightarrow 2x + 6$  and  $f^{-1}: x \rightarrow kx + p$ , where  $k$  and  $p$  are constants, find the value of  $k$  and of  $p$ . [ 3 marks ]

*Diberi fungsi  $f: x \rightarrow 2x + 6$  dan  $f^{-1}: x \rightarrow kx + p$ , dengan keadaan  $k$  dan  $p$  ialah pemalar, cari nilai  $k$  dan nilai  $p$ . [ 3 markah ]*

2

3
4

Answer / Jawapan:  $k = \dots\dots\dots$

$p = \dots\dots\dots$

- 3 Given the functions  $f: x \rightarrow x + 4$  and  $fg: x \rightarrow 2x - 3$ , find

*Diberi fungsi  $f: x \rightarrow x + 4$  dan  $fg: x \rightarrow 2x - 3$ , cari*

(a)  $g(x)$

the value of  $x$  when  $gf(x) = 5$ .

*nilai  $x$  apabila  $gf(x) = 5$ .*

[ 4 marks ]

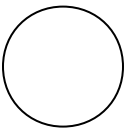
[ 4 markah ]

3

4
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Answer / Jawapan: (a) .....

(b) .....



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- 4 Form the quadratic equation which has roots  $-4$  and  $\frac{2}{3}$ .

Give your answer in the form  $ax^2 + bx + c = 0$ , where  $a$ ,  $b$  and  $c$  are constants.

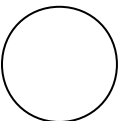
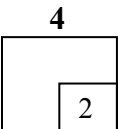
[ 2 marks ]

*Bentukkan persamaan kuadrat yang mempunyai punca- punca ialah  $-4$  and  $\frac{2}{3}$ .*

*Berikan jawapan anda dalam bentuk  $ax^2 + bx + c = 0$ , dengan keadaan  $a$ ,  $b$  dan  $c$  ialah pemalar.*

[ 2 markah ]

Answer / Jawapan: .....

**3472/1**

[ Lihat sebelah  
**SULIT**

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use only

- 5 Diagram 5 shows the graph of a quadratic functions  $f(x) = 3(x + p)^2 + 5$ , where  $p$  is a constant.

Rajah 5 menunjukkan graf kuadratik  $f(x) = 3(x + p)^2 + 5$ , dengan keadaan  $p$  ialah pemalar.

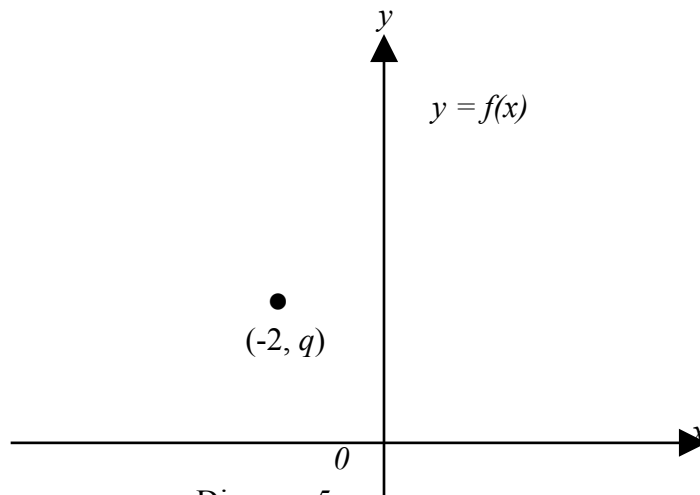


Diagram 5

Rajah 5

The curve  $y = f(x)$  has the minimum point  $(-2, q)$  where  $q$  is a constant.

Lengkung  $y = f(x)$  mempunyai titik minimum  $(-2, q)$  dengan keadaan  $q$  ialah pemalar.

State

Nyatakan

- (a) the value of  $p$ ,  
nilai  $p$ ,
- (b) the value of  $q$ ,  
nilai  $q$ ,
- (c) the equation of the axis of symmetry.  
persamaan paksi simetri.

[ 3 marks ]

[ 3 markah ]

Answer / Jawapan: (a)  $p =$ .....(b)  $q =$ .....

(c) .....

5

3

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[ Lihat sebelah  
**SULIT**

**SULIT****3472/1***For examiner's  
use only*

- 6 Find the range of values of  $x$  for which  $(x - 3)(2x + 1) > x^2 - 9$ .  
marks]

[4

*Cari julat nilai  $x$  bagi  $(x - 3)(2x + 1) > x^2 - 9$   
markah]*

[4

Answer / Jawapan: .....

**6**

4

- 7 Solve the equation  $3^{x+2} - 3^{x+1} = 54$

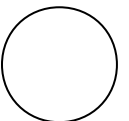
[ 3 marks ]

*Selesaikan persamaan  $3^{x+2} - 3^{x+1} = 54$*

[ 3 markah ]

**7**

3

**3472/1**[ Lihat sebelah  
**SULIT**

**SULIT****3472/1**For examiner's  
use only

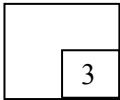
Answer / Jawapan: .....

- 8 Given that  $\log_3 x = h$  and  $\log_3 y = k$ , express  $\log_3 \frac{81x}{y}$  in term of  $h$  and  $k$ . [ 3 marks ]

Diberi  $\log_3 x = h$  dan  $\log_3 y = k$ , ungkapkan  $\log_3 \frac{81x}{y}$  dalam sebutan  $h$  dan  $k$ .

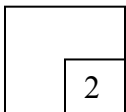
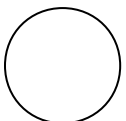
markah ]

[ 3

**8**

Answer / Jawapan: .....

- 9 Given a geometric progression  $3, 2m, p, \dots$ , express  $p$  in terms of  $m$ . [ 2 marks ]
- Diberi suatu jujukan geometri  $3, 2m, p, \dots$ , ungkapkan  $p$  dalam sebutan  $m$ . [ 2 markah ]

**9****3472/1**[ Lihat sebelah  
**SULIT**

**SULIT**

**3472/1**

Answer / Jawapan: ..... For examiner's use only

- 10** The first term of an arithmetic progression is 5 and the sum of the first eight term of the progression is 208.

*Sebutan pertama bagi suatu jangjang aritmetik ialah 5 dan hasil tambah bagi lapan sebutan pertama bagi jangjang itu ialah 208.*

Find

*Cari*

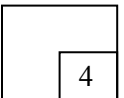
- (a) the common difference,  
*beza sepunya,*
- (b) the tenth term of the progression.  
*sebutan kesepuluh jangjang tersebut.*

[ 4 marks ]

[ 4 markah ]

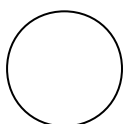
Answer / Jawapan: (a).....

**10**



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[ Lihat sebelah **SULIT** ]



**SULIT**

**3472/1**

*For  
examiner's  
use only*

(b).....

**11** The third term of a geometric progression is 24. The sum of the third term and the fourth term is 36.

*Sebutan ketiga suatu jangjang geometri ialah 24. Hasil tambah sebutan ketiga dan sebutan keempat ialah 36.*

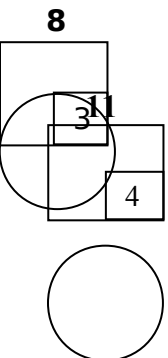
Find

*Cari*

- (a) the first term and the common ratio of the progression,  
*sebutan pertama dan nisbah sepunya jangjang itu,*
- (b) the sum to infinity of the progression.  
*hasil tambah hingga ketakterhinggaan jangjang itu.*

[ 4 marks ]

[ 4 markah ]



Answer / Jawapan: (a) .....

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[ Lihat sebelah  
**SULIT**

(b).....

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- 12 The variables  $x$  and  $y$  are related by the equation  $y = \frac{x}{p + qx}$ , where  $p$  and  $q$  are constants. Diagram 12 shows the straight line graph obtained by plotting  $\frac{1}{y}$  against  $\frac{1}{x}$ .

*Pembolehubah  $x$  dan  $y$  dihubungkan oleh persamaan  $y = \frac{x}{p + qx}$ , dengan keadaan*

*$p$  dan  $q$  ialah pemalar. Rajah 12 menunjukkan graf garis lurus yang diperolehi dengan memplot  $\frac{1}{y}$  melawan  $\frac{1}{x}$ .*

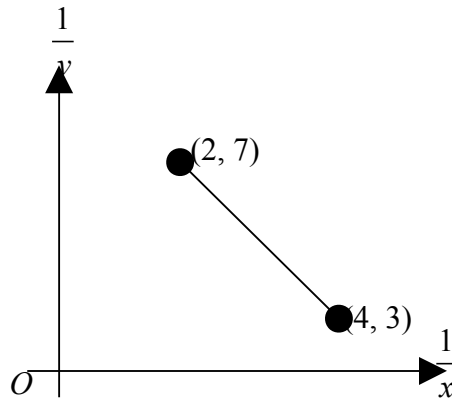


Diagram 12

Rajah 12

- (a) Express the equation  $y = \frac{x}{p + qx}$  in its linear form used to obtain the straight line graph shown in Diagram 12

*Ungkapkan persamaan  $y = \frac{x}{p + qx}$  dalam bentuk linear yang digunakan untuk memperoleh graf garis lurus seperti ditunjukkan dalam Rajah 12.*

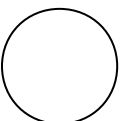
- (b) Find the value of  $p$  and of  $q$ .

*Cari nilai  $p$  dan nilai  $q$ .*

[ 4 marks ]

[ 4 markah ]

Answer / Jawapan: (a) .....



**SULIT****3472/1**

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examiner's  
use only

(b)  $p = \dots\dots\dots$

$q = \dots\dots\dots$

- 13** The points  $P(k, 2h)$ ,  $Q(3k, 4h)$  and  $R(6h, \frac{10}{3}k)$  are on a straight line.

Point  $Q$  divides  $PR$  internally in the ratio  $2 : 1$ . Express  $h$  in terms of  $k$ .

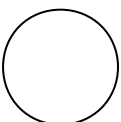
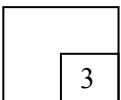
[ 3 marks ]

Titik-titik  $P(k, 2h)$ ,  $Q(3k, 4h)$  dan  $R(6h, \frac{10}{3}k)$  terletak pada garis lurus.

Titik  $Q$  membahagi dalam  $PR$  dengan nisbah  $2 : 1$ . Ungkapkan  $h$  dalam sebutan  $k$ .

[ 3 markah ]

Answer / Jawapan :  $h = \dots\dots\dots$

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[ Lihat sebelah  
**SULIT** ]

**SULIT****3472/1**

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use only

- 14 Diagram 14 shows a circle with centre  $O$  and radius 6 cm.

Rajah 14 menunjukkan bulatan berpusat  $O$  dan berjari 6 cm.

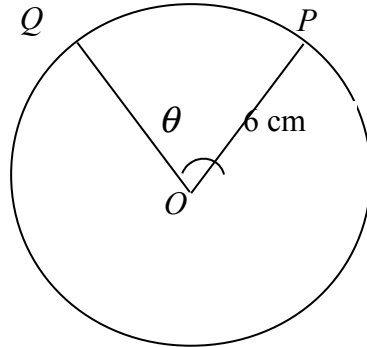


Diagram 14

Rajah 14

Given the length of the major arc  $PQ$  is 33 cm, find the value of  $\theta$ , in radians.

Diberi panjang lengkok major  $PQ$  ialah 33 cm, cari nilai sudut  $\theta$ , dalam radian.

[Use / Guna  $\pi = 3.142$ ]

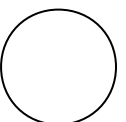
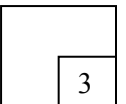
[ 3 marks ]

[ 3 markah ]

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[ Lihat sebelah  
**SULIT**

14



**SULIT****3472/1**

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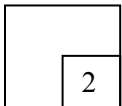
Answer / Jawaban : .....

**15** It is given that  $\underline{u} = \begin{pmatrix} 12 \\ 4 \end{pmatrix}$  and  $\underline{v} = \begin{pmatrix} 6 \\ k-1 \end{pmatrix}$ . Find the value of  $k$  when  $\underline{u}$  and  $\underline{v}$  are parallel.

[ 2 marks ]

Diberi  $\underline{u} = \begin{pmatrix} 12 \\ 4 \end{pmatrix}$  dan  $\underline{v} = \begin{pmatrix} 6 \\ k-1 \end{pmatrix}$ . Cari nilai  $k$  apabila  $\underline{u}$  dan  $\underline{v}$  adalah selari.

[ 2 markah ]

**15**

Answer / Jawaban: .....

**16**  $OABC$  is a parallelogram such that  $\overrightarrow{OA} = \underline{i} + \underline{j}$  and  $\overrightarrow{OC} = -4\underline{i} + 3\underline{j}$

$OABC$  ialah sebuah segiempat selari dengan keadaan  $\overrightarrow{OA} = \underline{i} + \underline{j}$  dan  $\overrightarrow{OC} = -4\underline{i} + 3\underline{j}$

Find

Cari

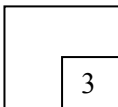
(a)  $\overrightarrow{OB}$ ,

(b) unit vector in the direction of  $\overrightarrow{OB}$ .

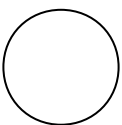
vektor unit dalam arah  $\overrightarrow{OB}$ .

[ 3 marks ]

[ 3 markah ]

**16****3472/1**

[ Lihat sebelah  
**SULIT** ]



**SULIT****3472/1**

Answer / Jawapan: (a) .....

(b) .....

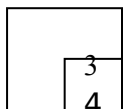
*For  
examiner's  
use only***17** Given  $\sin \theta = k$ , where  $k$  is a constant and  $90^\circ \leq \theta \leq 180^\circ$ *Diberi  $\sin \theta = k$ , dengan keadaan  $k$  ialah pemalar dan  $90^\circ \leq \theta \leq 180^\circ$* Find in terms of  $k$ *Cari dalam sebutan  $k$* (a)  $\tan \theta$ ,(b)  $\sin 2\theta$ .

[ 3 marks ]

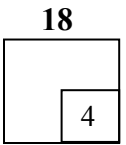
[ 3 markah ]

Answer/ Jawapan: (a) .....

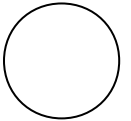
(b) .....

**17****18** Solve the equation  $\sin A + 2 \cos^2 A = 1$  for  $0^\circ \leq A \leq 360^\circ$ . [ 4 marks]*Selesaikan persamaan  $\sin A + 2 \cos^2 A = 1$  bagi  $0^\circ \leq A \leq 360^\circ$ . [4  
markah]*

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examiner's  
use only



Answer / Jawaban: .....



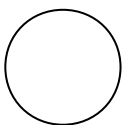
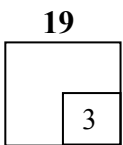
**19** The curve  $y = 7 + 18px - 2x^2$  has a maximum point at  $x = 3$ , where  $p$  is a constant.

Find the value of  $p$ .

[ 3 marks ]

*Lengkung  $y = 7 + 18px - 2x^2$  mempunyai titik maximum di  $x = 3$ , dengan keadaan  $p$  ialah pemalar. Cari nilai  $p$ .*

[ 3 markah ]



Answer / Jawaban:  $p = \dots\dots\dots$ For examiner's  
use only

- 20** Two variables ,  $x$  and  $y$ , are related by the equation  $y = 4x(x + 1)$  .

Express, in terms of  $h$ , the approximate change in  $y$ , when  $x$  change from 3 to  $3 + h$ , where  $h$  is a small value.

[ 3

marks ]

*Dua pemboleh ubah,  $x$  dan  $y$ , dihubungkan oleh persamaan  $y = 4x(x + 1)$  .*

*Ungkapkan, dalam sebutan  $h$ , perubahan kecil bagi  $y$ , apabila  $x$  berubah daripada 3 kepada  $3 + h$ , dengan keadaan  $h$  ialah satu nilai kecil.*

[ 3

markah ]

Answer / Jawaban:  $\dots\dots\dots$ **20**

3

- 21** Given that  $\int_1^6 g(x)dx = 4$ , find

Diberi  $\int_1^6 g(x)dx = 4$ , cari

(a)  $\int_6^1 g(x)dx + 8$  ,

**SULIT****3472/1**

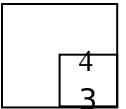
(b)  $\int_1^6 [2g(x) - 3] dx.$

[ 4 marks ]

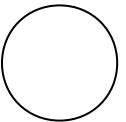
[ 4 markah ]

**21**

Answer / Jawapan: (a).....



(b).....

For examiner's  
use only

- 22 The mean of 5 numbers is  $\sqrt{20}$ . The sum of the squares of the numbers is  $25k$  and the standard deviation is  $p$ .

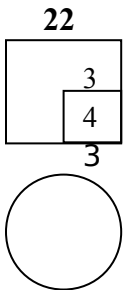
Express  $k$  in the terms of  $p$ .

[ 3 marks ]

*Min bagi 5 nombor ialah  $\sqrt{20}$ . Hasil tambah kuasa dua nombor-nombor itu ialah  $25k$  dan sisihan piawainya ialah  $p$ .*

Ungkapkan  $k$  dalam bentuk  $p$ .

[ 3 markah ]



Answer / Jawapan: .....

For examiner's  
use only

- 23** A club committee consists of 8 students. The committee is chosen from 5 prefects, 4 librarians and 3 monitors.

*Satu jawatankuasa kelab terdiri daripada 8 orang pelajar. Jawatankuasa itu dipilih daripada 5 pengawas, 4 pustakawan dan 3 ketua darjah.*

Calculate the number of different ways the committee can be chosen if

*Hitung bilangan cara yang berlainan jawatankuasa itu boleh dipilih jika*

- (a) there is no restriction,

*tiada syarat dikenakan,*

- (b) the committee contains all prefects and only 2 monitors.

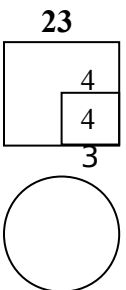
*jawatankuasa mengandungi semua pengawas dan hanya 2 ketua darjah.*

[ 4 marks ]

[ 4 markah ]

Answer/Jawapan: (a) .....

(b) .....

For examiner's  
use only**24** Table 24 shows the number of coloured marbles in a box.*Jadual 24 menunjukkan bilangan guli berwarna di dalam sebuah kotak.*

Colour <i>Warna</i>	Number of marbles <i>Bilangan guli</i>
Blue <i>Biru</i>	2
Green <i>Hijau</i>	3
Red <i>Merah</i>	4

Table 24

*Jadual 24*

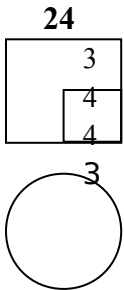
Two marbles are drawn at random from the box.

Find the probability that both marbles are of the same colour.

*Dua biji guli dikeluarkan secara rawak daripada kotak itu.**Cari kebarangkalian bahawa kedua-dua biji guli itu sama warna.*

[ 3 marks ]

[ 3 markah ]



Answer / Jawapan: ..... For examiner's  
use only

- 25 Diagram 25 shows a standard normal distribution graph.  
*Rajah 25 menunjukkan satu graf taburan normal piawai.*

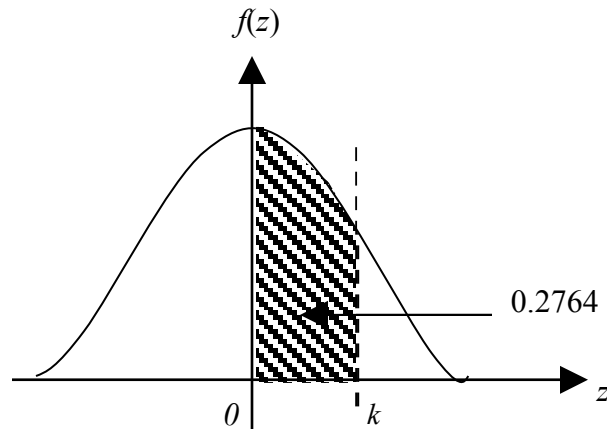


Diagram 25

*Rajah 25*

- (a) Given that  $P(0 < z < k) = 0.2764$ , find the value of  $k$ .  
*Diberi  $P(0 < z < k) = 0.2764$ , cari nilai  $k$ .*
- (b)  $X$  is a continuous random variable which is normally distributed with a mean  $\mu$  and a variance 4. Find the value of  $\mu$  when the value of  $X = 50.9$  is correspond to the value of  $k$ .

*$X$  ialah pembolehubah rawak selanjur yang bertaburan secara normal dengan nilai  $\mu$  dan varians 4. Cari nilai  $\mu$  apabila nilai  $X = 50.9$  adalah sepadan dengan nilai  $k$ .*

**SULIT****3472/1**

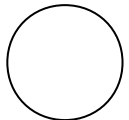
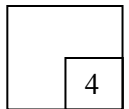
[ 4 marks ]

[ 4 markah ]

Answer / Jawapan: (a).....

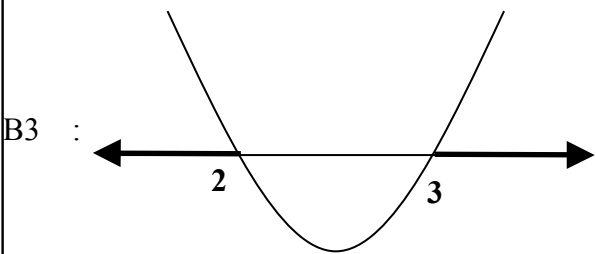
(b).....

25



<b>MARKING SCHEME</b> <b>ADDITIONAL MATHEMATICS 3472/1</b> <b>PKBS 3 / TRIAL SPM 2010</b>
-------------------------------------------------------------------------------------------------

NO	MARK SCHEME	SUB MARKS	TOTAL MARKS
1	(a) many to one  (b) $f(x) = x^2$	1  1	2
2	$k = \frac{1}{2}$ , $p = -3$ [both]  B2: $k = \frac{1}{2}$ <u>or</u> $p = -3$  B1 : $\frac{x-6}{2}$ <u>or</u> $\frac{x-p}{k}$	3	3
3	(a) $2x - 7$  B1: $g(x) + 4 = 2x - 3$  (b) 2  B1: $2(x + 4) - 7 = 5$	2  2	4
4	$3x^2 + 10x - 8 = 0$ <u>or</u> $x^2 + \frac{10}{3}x - \frac{8}{3} = 0$  B1: $x^2 - (-4 + \frac{2}{3})x + (-4 \times \frac{2}{3}) = 0$ <u>OR</u>	2	2

	$(x+4)\left(x-\frac{2}{3}\right) = 0$ <u>or</u> $(x+4)(3x-2) = 0$		
5	(a) 2 (b) 5 (c) $x = -2$ <u>or</u> $x+2 = 0$	1 1 1	3
6	$x < 2$ , $x > 3$ (both)   B3 : B2 : $(x-2)(x-3) > 0$ B1 : $x^2 - 5x + 6 > 0$	4	4
7	2 B2 : $3^x = 9$ B1 : $3^x(3^2 - 3) = 54$	3	3
8	$4 + h - k$ B2 : $\log_3 81 + \log_3 x - \log_3 y$ B1 : $\log 81x - \log y$ <i>or</i> $\log 81 + \log x$	3	3
9	$p = \frac{4m^2}{3}$ <u>or</u> $p = 1.333m^2$ B1: $\frac{2m}{3} = \frac{p}{2m}$	2	2
10	(a) 6 B1: $\frac{8}{2}[2(5) + (8-1)d]$	2	4

	(b) 59 B1: $5 + (10 - 1)6$	2	
11	(a) $r = \frac{1}{2}$ <u>or</u> $0.5$ , $a = 96$ B1: $24(1+r) = 36$ (b) 192 B1: $\frac{96}{1 - \frac{1}{2}}$	2  2	4
12	(a) $\frac{1}{y} = \frac{p}{x} + q$ (b) $p = -2$ , $q = 11$ (both) B2: $p = -2$ <u>or</u> $q = 11$ B1: $p = \frac{7-3}{2-4}$ <u>OR</u> $7 = 2p + q$ <u>or</u> $3 = 4p + q$	1  3	4
13	$h = \frac{2}{3}k$ B2: $\frac{(1)(k) + (2)(6h)}{2+1} = 3k$ <u>or</u> $\frac{(1)(2h) + (2)(\frac{10}{3}k)}{2+1} = 4h$ B1: $\frac{(1)(k) + (2)(6h)}{2+1}$ <u>or</u> $\frac{(1)(2h) + (2)(\frac{10}{3}k)}{2+1}$	3	3
14	0.784 B2: $6(2\pi - \theta) = 33$ B1: $2\pi - \theta$ <u>or</u> $360^\circ - \theta$	3	3
15	3 B1: $\lambda = \frac{1}{2}$ <u>or</u> $\frac{k-1}{6} = \frac{4}{12}$	2	2

**SULIT****3472/1**

16	<p>(a) <math>-3\underline{i} + 4\underline{j}</math></p> <p>(b) <math>-\frac{3}{5}\underline{i} + \frac{4}{5}\underline{j}</math></p> <p>B1 : <math>\sqrt{(-3)^2 + 4^2}</math></p>	1  2	3
17	<p>(a) <math>-\frac{k}{\sqrt{1-k^2}}</math></p> <p>B1 : <math>\sqrt{1-k^2}</math> <u>or</u> see in diagram</p> <p>(b) <math>-2k\sqrt{1-k^2}</math></p>	2  1	3
18	<p><math>90^\circ, 210^\circ, 330^\circ</math></p> <p>B3: <math>90^\circ, 210^\circ</math></p> <p>B2: <math>(2 \sin A + 1)(\sin A - 1) = 0</math></p> <p>B1: <math>\sin A + 2(1 - \sin^2 A) = 1</math></p>	4	4
19	<p><math>\frac{2}{3}</math> <u>or</u> 0.6667</p> <p>B2 : <math>18p - 4(3) = 0</math></p> <p>B1 : <math>\frac{dy}{dx} = 18p - 4x</math></p>	3	3
20	<p><math>28h</math></p> <p>B2 : <math>\partial y \approx [8(3) + 4] \times h</math></p> <p>B1 : <math>\frac{dy}{dx} = 8x + 4</math> <u>or</u> <math>\delta x = h</math></p>	3	3
21	<p>(a) 4</p> <p>(b) -7</p> <p>B2 : <math>2(4) - [3(6) - 3(1)]</math></p>	1  3	4

	$B1 : \int 2g(x)dx - \int 3dx \quad \text{or} \quad 2\int g(x)dx \quad \text{or} \quad 3x$		
22	$k = \frac{p^2 + 20}{5} \quad \text{or} \quad k = \frac{p^2}{5} + 4$ $B2: p^2 = \frac{25k}{5} - (\sqrt{20})^2$ $B1 : \bar{x} = \sqrt{20} \quad \text{or} \quad \sum x^2 = 25k \quad \text{or} \quad \sigma = p$	3	3
23	(a) 495 (b) 12 $B2 : {}^5C_5 \times {}^3C_2 \times {}^4C_1$ $B1 : {}^5C_5 \times {}^4C_1 \quad \text{or} \quad {}^4C_1 \times {}^3C_2 \quad \text{or} \quad {}^5C_5 \times {}^3C_2$	1 3	4
24	$\frac{20}{72} \quad \text{or} \quad \frac{5}{18} \quad \text{or} \quad 0.2778$ $B2 : \left(\frac{2}{9} \times \frac{1}{8}\right) + \left(\frac{3}{9} \times \frac{2}{8}\right) + \left(\frac{4}{9} \times \frac{3}{8}\right)$ $B1 : \left(\frac{2}{9} \times \frac{1}{8}\right) \text{or} \left(\frac{3}{9} \times \frac{2}{8}\right) \text{or} \left(\frac{4}{9} \times \frac{3}{8}\right)$	3	3
25	(a) 0.76 $B1 : P(z > k) = 0.5 - 0.2764$ (b) 49.38 $B1 : 0.76 = \frac{50.9 - \mu}{2}$	2 2	4

**SULIT**

3472/2

3472/1  
Matematik  
Tambahan  
Kertas 2  
Ogos/ September  
2010  
 $2\frac{1}{2}$  Jam

Nama : .....

Tingkatan : .....

**JABATAN PELAJARAN KELANTAN  
DENGAN KERJASAMA  
PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA  
SEKOLAH MENENGAH MALAYSIA  
CAWANGAN KELANTAN**

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**PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA  
TAHUN 2010**

---

**MATEMATIK TAMBAHAN**

**KERTAS 2**

**Masa : Dua Jam Tiga Puluh Minit**

---

**JANGAN BUKA BUKU SOALAN INI SEHINGGA DIBERITAHU**

*Arahan:*

- 1. Kertas soalan ini adalah dalam dwibahasa.*
- 2. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Malaysia.*
- 3. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

---

Kertas soalan ini mengandungi 18 halaman bercetak

**[Lihat Sebelah  
SULIT**

**SULIT****3472/2****Section A**  
**Bahagian A**

[40 marks]

[40 markah]

Answer **all** questions.  
Jawab **semua** soalan.

- 1 Solve the following simultaneous equations:

*Selesaikan persamaan serentak berikut:*

$$2x + y - 8 = 0$$

$$4x^2 + 3y^2 - 52 = 0$$

[5 marks]

[5 markah]

- 2 Diagram 2 shows the curve of a quadratic function  $f(x) = x^2 - kx - 8$ . The curve has a minimum point at  $Q(1, m)$  and intersect the  $x$ -axis at point  $A$  and point  $B$ .

*Rajah 2 menunjukkan lengkung bagi fungsi kuadratik  $f(x) = x^2 - kx - 8$ . Lengkung itu mempunyai titik minimum pada  $Q(1, m)$  dan menyalang paksi- $x$  di titik  $A$  dan titik  $B$ .*

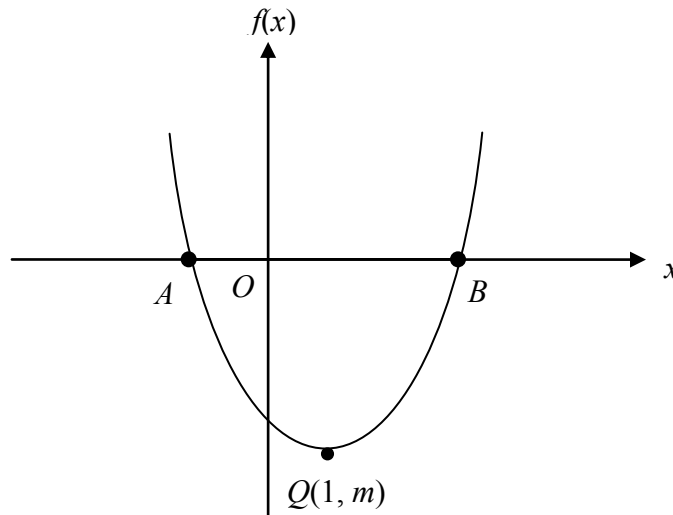


Diagram 2  
Rajah 2

- (a) By using the method of completing the square, find the value of  $k$  and of  $m$ . [4 marks]

**[Lihat Sebelah**  
**SULIT**

**SULIT****3472/2**

Dengan menggunakan kaedah penyempurnaan kuasa dua, cari nilai  $k$  dan nilai  $m$ . [4 markah]

(b) Find the coordinates of  $A$  and of  $B$ . [3 marks]

Cari koordinat  $A$  dan  $B$ . [3 markah]

**3** A roll of thread with  $120\pi$  cm long is cut into six parts to make up six circles as shown in the diagram 3.

Segelung benang dengan panjang  $120\pi$  dipotong enam bahagian untuk membentuk enam bulatan seperti ditunjukkan dalam rajah 3.

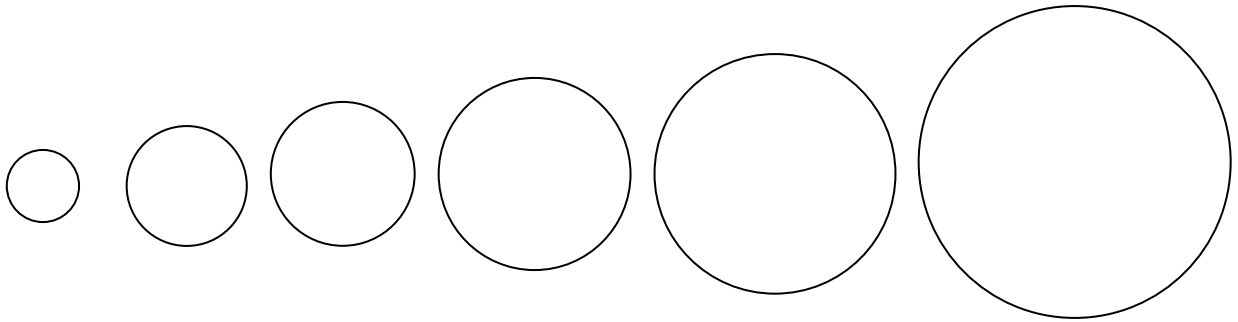


Diagram 3

Rajah 3

The radius of the circles increase by 3 cm consecutively.

Jejari bulatan bertambah 3 cm secara berturutan .

Calculate

Hitung

(a) the radius of the smallest circle, [2 marks]  
jejari bulatan yang terkecil, [2 markah]

(b) the circumference of the last circle, [2 marks]  
ukur lilit bagi bulatan terakhir, [2 markah]

(c) the number of circles obtained if the length of thread is  $320\pi$ . [3 marks]  
bilangan bulatan jika panjang benang ialah  $320\pi$ . [3 markah]

[Lihat Sebelah  
**SULIT**

**SULIT****3472/2**

4 (a) Prove that  $\frac{4\sin x}{\sqrt{1+\tan^2 x}} = 2 \sin 2x$ . [2 marks]

Buktikan  $\frac{4\sin x}{\sqrt{1+\tan^2 x}} = 2 \sin 2x$ . [2 markah]

(b) Sketch the graph of  $y = |2 \sin 2x|$  for  $0 \leq x \leq 2\pi$

Lakar graf bagi  $y = |2 \sin 2x|$  for  $0 \leq x \leq 2\pi$

Hence, using the same axis, sketch a suitable line to find the number of solutions for the equation

$$2\pi \left| \frac{4\sin x}{\sqrt{1+\tan^2 x}} \right| - x = 0 \text{ for } 0 \leq x \leq 2\pi$$

State the number of solutions.

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan

$$2\pi \left| \frac{4\sin x}{\sqrt{1+\tan^2 x}} \right| - x = 0 \text{ for } 0 \leq x \leq 2\pi$$

Nyatakan bilangan penyelesaian itu.

[5 marks]

[5 markah]

5 Table 5 shows the distribution of scores obtained by a contestants in a quiz.

Jadual 5 menunjukkan taburan markah yang diperolehi oleh peserta dalam suatu pertandingan kuiz.

Scores	1 – 10	11– 20	21– 30	31– 40	41– 50	51– 60
Number of contestants	3	6	8	$n$	4	2

Table 5

Jadual 5

(a) Given that mean score of the distribution is 28.5, calculate the value of  $n$ .

[3 marks]

Diberi markah min bagi taburan ini ialah 28.5, kira nilai bagi  $n$ .

[3 markah]

(b) Without using an ogive, calculate the median mark.

[3 marks]

Tanpa menggunakan ogive, kira markah median.

[3 markah]

**[Lihat Sebelah  
SULIT**

**SULIT****3472/2**

- 6 Diagram 6 shows sector  $OPQ$  and sector  $ORST$  with centre  $O$ .  
*Rajah 6 menunjukkan sektor  $OPQ$  dan sektor  $ORST$  berpusat  $O$ .*

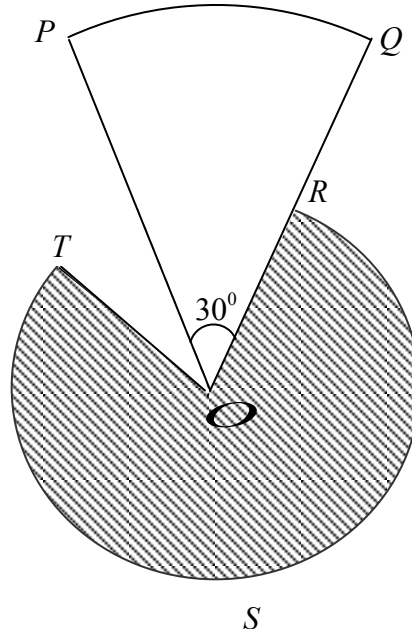


Diagram 6  
*Rajah 6*

Given  $OP = 10$  cm,  $\angle POQ = 30^\circ$  and  $R$  is the midpoint  $OQ$ . The perimeter of sector  $OPQ$  is equal to the length of the major arc  $RST$ .

*Diberi  $OP = 10$  cm,  $\angle POQ = 30^\circ$  dan  $R$  adalah titik tengah  $OQ$ . Perimeter sektor  $OPQ$  sama dengan panjang lengkok major  $RST$ .*

Find  
 Cari

- (a) the length of arc, in cm,  $PQ$ , [3 marks]  
*panjang lengkok, dalam cm,  $PQ$ ,* [3 markah]
- (b) the angle, in radians, subtended by the major arc  $RST$  at centre  $O$ , [3 marks]  
*sudut, dalam radian, yang dicakupi oleh lengkok major  $RST$  di pusat  $O$ ,* [3 markah]
- (c) the area, in  $\text{cm}^2$ , of the shaded region. [2 marks]  
*luas, dalam  $\text{cm}^2$ , kawasan berlorek.* [2 markah]

**[Lihat Sebelah  
SULIT]**

**SULIT**

3472/2

**Section B**  
**Bahagian B**[40 marks]  
[40 markah]

Answer any **four** questions from this section.  
*Jawab mana-mana empat soalan daripada bahagian ini.*

- 7 Diagram 7 shows the curve  $y = x^2 + 2$  and the tangent to the curve at the point  $A(2, 6)$ .

*Rajah 7 menunjukkan lengkung  $y = x^2 + 2$  dan tangen kepada lengkung itu pada  $A(2, 6)$ .*

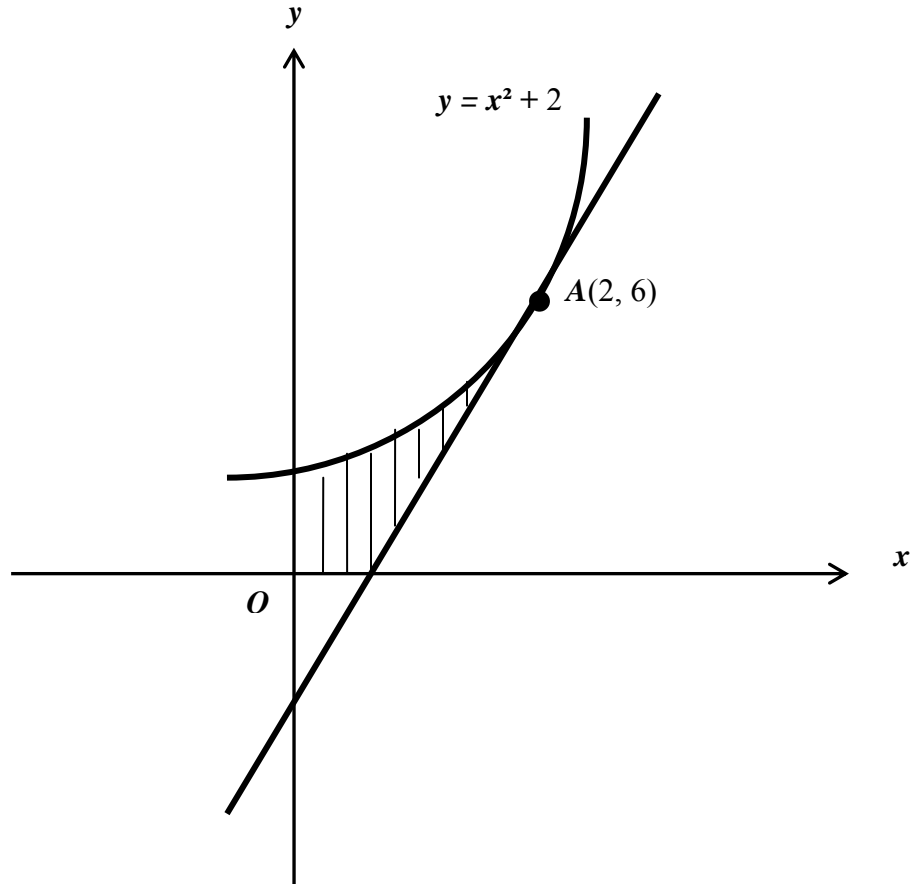


Diagram 7  
*Rajah 7*

[Lihat Sebelah  
**SULIT**]

**SULIT**

3472/2

Calculate  
Hitung

- (a) the equation of the tangent at  $A$ , [3 marks]  
*persamaan tangen pada  $A$ ,* [3 markah]
- (b) the area of the shaded region, [3 marks]  
*luas rantau yang berlorek* [3 markah]
- (c) the volume of revolution, in terms of  $\pi$ , when the region bounded by the curve and the straight line  $y = 6$  is rotated through  $360^\circ$  about the  $y$ -axis. [4 marks]  
*isipadu kisanan, dalam sebutan  $\pi$ , apabila rantau yang dibatasi oleh lengkung itu dan garis lurus  $y = 6$  dikisarkan melalui  $360^\circ$  pada paksi- $y$*  [4 markah]

8 Use graph paper to answer this question.

*Gunakan kertas graf untuk menjawab soalan ini.*

Table 8 shows the values of two variables,  $x$  and  $y$  obtained from an experiment. Variables  $x$  and  $y$  are related by the equation  $y = pk^{\sqrt{x}}$ , where  $k$  and  $p$  are constants.

*Jadual 8 menunjukkan nilai-nilai bagi dua pembolehubah,  $x$  dan  $y$ , yang diperolehi daripada satu eksperimen. Pembolehubah  $x$  dan  $y$  dihubungkan oleh persamaan  $y = pk^{\sqrt{x}}$ , dengan keadaan  $k$  dan  $p$  ialah pemalar.*

$x$	4	16	36	64	100	144
$y$	1.86	2.63	3.85	5.50	7.94	11.22

Table 8  
*Jadual 8*

- (a) Plot  $\log_{10} y$  against  $\sqrt{x}$ , using a scale of 2 cm to 2 unit on the  $\sqrt{x}$ -axis and 2 cm to 0.1 unit on the  $\log_{10} y$ -axis. Hence, draw the line of best fit. [5 marks]

*Plot  $\log_{10} y$  melawan  $\sqrt{x}$ , dengan menggunakan skala 2 cm kepada 2 unit pada paksi- $\sqrt{x}$  dan 2 cm kepada 0.1 unit pada paksi- $\log_{10} y$ . Seterusnya, lukis garis lurus penyuaian terbaik.*

[5 markah]

[Lihat Sebelah  
**SULIT**

**SULIT****3472/2**

- (b) Use your graph in 8(a) to find the value of  
Gunakan graf anda di 8(a) untuk mencari nilai
- $k$
  - $p$ .

[5 marks]

[5 markah]

- 9 Solution to this question by scale drawing will not be accepted.  
Penyelesaian soalan ini secara lukisan tidak akan diterima.

Diagram 9 shows a triangle  $KLN$  drawn on a cartesian plane. Point  $M$  lies on the straight line  $KL$ .

Rajah 9 menunjukkan segitiga  $KLN$  yang dilukis di atas satah Cartesian. Titik  $M$  terletak di atas garis lurus  $KL$ .

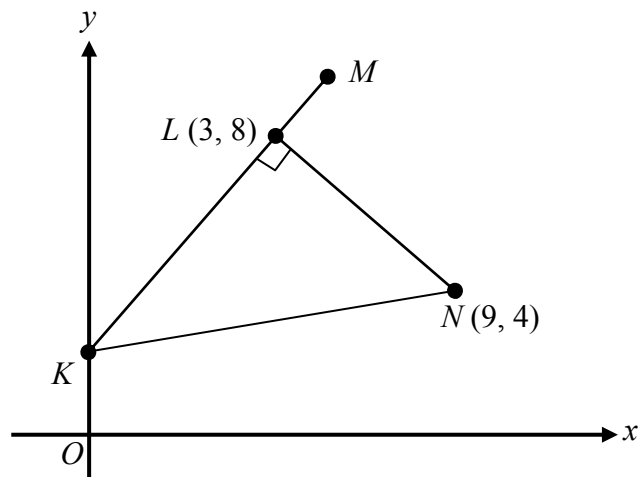


Diagram 9  
Rajah 9

The line  $KL$  is perpendicular to the line  $LN$  and intercepts the  $y$ -axis at point  $K$ .  
Garis  $KL$  adalah berserenjang kepada garis  $LN$  dan menyilang paksi  $-y$  dititik  $K$ .

Find  
Cari

- (a) (i) the equation of the line  $KL$ , [4 marks]  
persamaan garis  $KL$ , [4 markah]
- (ii) the area, in unit<sup>2</sup>, of triangle  $KLN$ . [3 marks]  
luas, dalam unit<sup>2</sup>, segitiga  $KLN$ . [3 markah]

**[Lihat Sebelah  
SULIT**

**SULIT****3472/2**

- (b) A point  $P$  moves such that its distance from point  $M(5, 11)$  is always twice its distance from point  $N$ . Find the equation of the locus of  $P$ .

[3 marks]

*Suatu titik  $P$  bergerak dengan keadaan jaraknya dari titik  $M(5, 11)$  adalah sentiasa dua kali jaraknya dari titik  $N$ . Cari persamaan lokus bagi  $P$ .*

[3 markah]

- 10 Diagram 10 shows, a quadrilateral  $OASB$ . The diagonals  $AB$  and  $OS$  intersect at  $R$ .  
Rajah 10 menunjukkan satu segiempat  $OASB$ . Pepenjuru  $AB$  dan  $OS$  bersilang di  $R$ .

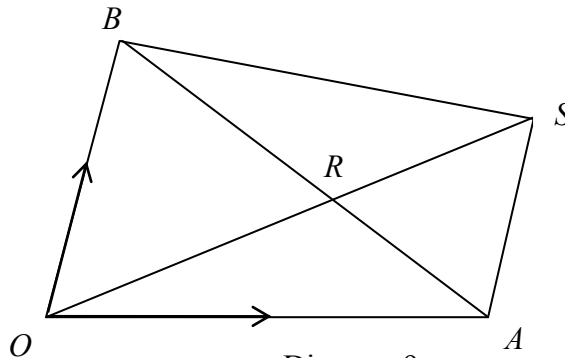


Diagram 9  
Rajah 9

It is given that  $\overrightarrow{OA} = 10\underline{a}$ ;  $\overrightarrow{OB} = 8\underline{b}$  and  $\overrightarrow{AS} = \frac{3}{4}\overrightarrow{OB}$ .

Diberi  $\overrightarrow{OA} = 10\underline{a}$ ,  $\overrightarrow{OB} = 8\underline{b}$  dan  $\overrightarrow{AS} = \frac{3}{4}\overrightarrow{OB}$ .

- (a) Express in terms of  $\underline{a}$  and  $\underline{b}$

Ungkapkan dalam sebutan  $\underline{a}$  dan  $\underline{b}$

(i)  $\overrightarrow{OS}$ ,

(ii)  $\overrightarrow{AB}$ .

[2 marks]

[2 markah]

- (b) Given  $\overrightarrow{OR} = m\overrightarrow{OS}$  and  $\overrightarrow{RB} = n\overrightarrow{AB}$ . Express  $\overrightarrow{OR}$  in terms of

Diberi  $\overrightarrow{OR} = m\overrightarrow{OS}$  dan  $\overrightarrow{RB} = n\overrightarrow{AB}$ . Ungkapkan  $\overrightarrow{OR}$  dalam sebutan

(i)  $\underline{m}$ ,  $\underline{a}$  and  $\underline{b}$

(ii)  $\underline{n}$ ,  $\underline{a}$  and  $\underline{b}$

[3 marks]

[3 markah]

- (c) Hence, find the value for  $\frac{m}{n}$

[2 marks]

Seterusnya, cari nilai untuk  $\frac{m}{n}$

[2 markah]

**[Lihat Sebelah  
SULIT**

**SULIT****3472/2**

- (d) Given  $\overline{OB}$  is perpendicular to  $\overline{OA}$  and  $|\underline{b}| = 1$  and  $|\underline{a}| = 2$ . Find the area for the quadrilateral  $OASB$ .  
[3 marks]  
*Diberi  $\overline{OB}$  berserenjang dengan  $\overline{OA}$  dan  $|\underline{b}| = 1$  dan  $|\underline{a}| = 2$ . Cari luas segiempat  $OASB$ .*  
[3 markah]
- 11 (a) In a school 70% of the candidates passed the SPM examination.  
*Dalam satu sekolah 70% calon-calon lulus peperiksaan SPM.*
- (i) If a random sample of 5 candidates are chosen, find the probability that not more than 2 candidates passed the SPM examination.  
*Jika satu sampel rawak 5 orang calon dipilih, cari kebarangkalian tidak lebih daripada 2 orang calon lulus peperiksaan SPM itu.*
- (ii) If the number of SPM candidates in that school is 950, find the mean of the number of candidates who failed the examination.  
*Jika bilangan calon SPM dalam sekolah itu ialah 950, cari min bagi bilangan calon yang gagal peperiksaan itu.*  
[5 marks]  
[5 markah]
- (b) The mass of students in a school has a normal distribution with a mean of 55 kg and the variance of  $16 \text{ kg}^2$ .  
*Jisim pelajar dalam satu sekolah adalah mengikut satu taburan normal dengan min 55 kg dan varians  $16 \text{ kg}^2$ .*
- (i) Find the probability that the mass of the students chosen randomly from this school is more than 65 kg.  
*Cari kebarangkalian bahawa jisim pelajar yang dipilih secara rawak dari sekolah ini adalah lebih daripada 65 kg.*
- (ii) Find the percentage of students with the mass between 60 kg to 65 kg.  
*Cari peratusan pelajar dengan jisim antara 60 kg hingga 65 kg.*  
[5 marks]  
[5 markah]

**[Lihat Sebelah  
SULIT**

**SULIT**

3472/2

**Section C**  
**Bahagian C**

[40 marks]  
[40 markah]

Answer any **two** questions from this section.  
Jawab mana-mana **dua** soalan daripada bahagian ini.

- 12 Diagram 12 shows a quadrilateral  $ABCD$ .  
Rajah 12 menunjukkan sebuah sisi empat  $ABCD$ .

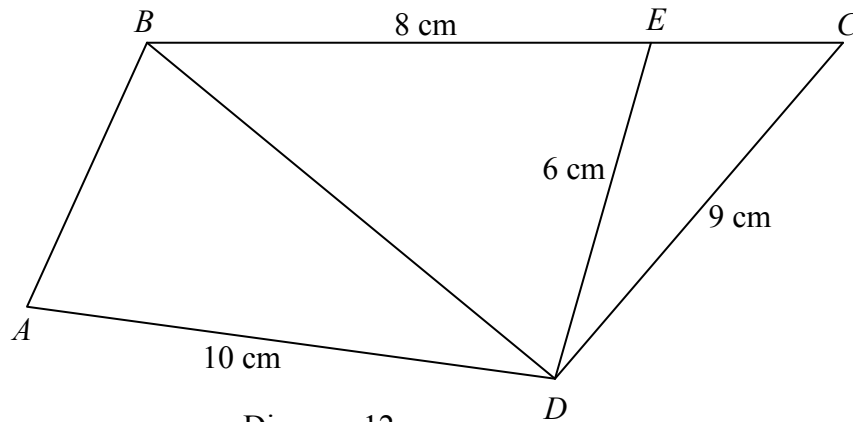


Diagram 12  
Rajah 12

It is given that  $BEC$  is straight line,  $\angle CED$  is obtuse,  $\angle DCE = 40^\circ$  and  $\angle ADC = 122.57^\circ$ .

Diberi  $BEC$  ialah garis lurus,  $\angle CED$  ialah sudut cakah,  $\angle DCE = 40^\circ$  dan  $\angle ADC = 122.57^\circ$ .

- (a) Calculate  
Hitung
- $\angle CED$ ,
  - the length, in cm, of  $BD$ .  
panjang, dalam cm,  $BD$ .

[4 marks]  
[4 markah]

- (b) Given that the area of triangle  $ABD$  is  $18 \text{ cm}^2$ , find  
Diberi luas segitiga  $ABD$  ialah  $18 \text{ cm}^2$ , cari

- $\angle ADB$ ,
- the area, in  $\text{cm}^2$ , of quadrilateral  $ABCD$ .  
luas, dalam  $\text{cm}^2$ , sisi empat  $ABCD$ .

[6 marks]  
[6 markah]

**SULIT****3472/2**

**13** A healthy fruit drink is mixed by using four different fruits  $P$ ,  $Q$ ,  $R$  and  $S$ .

Table 13 shows the prices, per kg, of the fruits used.

*Satu minuman buah berkhasiat diperoleh daripada campuran empat jenis buah-buahan,  $P$ ,  $Q$ ,  $R$  and  $S$ . Jadual 13 menunjukkan harga, per kg, buah-buahan yang digunakan.*

Fruit <i>Buah-buahan</i>	Price (RM) per kg for the year <i>Harga (RM) per kg pada tahun</i>	
	2007	2009
$P$	8.00	$x$
$Q$	15.00	16.50
$R$	$y$	4.50
$S$	2.40	$z$

Table 13

*Jadual 13*

- (a) Given that the index number of fruit  $P$  used in the year 2009 based on the year 2007 is 140, calculate the value of  $x$ .

*Diberi nombor indeks bagi buah  $P$  yang digunakan dalam tahun 2009 berasaskan tahun 2007 ialah 140, hitung nilai bagi  $x$ .*

[2 marks]

[2 markah]

- (b) Given that the price index of fruit  $R$  for the projected year 2010 based on the years 2009 and 2007 are 120 and 180 respectively, find the value of  $y$ .

*Diberi indeks harga bagi buah  $R$  yang dijangka pada tahun 2010 berasaskan tahun 2009 dan 2007 ialah 120 dan 180 masing-masing, cari nilai  $y$ .*

[4 marks]

[4 markah]

- (c) The amount of fruits  $P$ ,  $Q$ ,  $R$  and  $S$  used in the healthy fruit drink in the ratio of 2 : 3 : 1 : 4. Given that the composite index of the fruit drink for the year 2009 based on the year 2007 is 122.

**[Lihat Sebelah  
SULIT**

**SULIT****3472/2**

*Kandungan buah-buahan P, Q, R dan S yang diguna dalam minuman buah berkhasiat adalah mengikut nisbah 2 : 3 : 1 : 4. Diberi indeks gubahan bagi minuman tersebut pada tahun 2009 berasaskan tahun 2007 ialah 122.*

Calculate

*Hitung*

- (i) the value of  $z$ ,  
*nilai  $z$ ,*
- (ii) the price of a bottle of the healthy fruit drink in the year 2007 if the price of the same drink is RM7.50 in the year 2009.  
*harga bagi sebotol minuman buah berkhasiat pada tahun 2007 jika harga bagi minuman tersebut adalah RM7.50 pada tahun 2009.*

[4 marks]

[4 markah]

- 14** A paper factory wants to build 2 types of boxes to save the medicine bottles of type  $x$  and type  $y$ . A box of  $x$  can store 4 bottles of medication and type  $y$  to save 8 bottles of medicine.

*Sebuah kilang kertas ingin membina 2 jenis kotak bagi meyimpan botol-botol ubat iaitu jenis  $x$  dan jenis  $y$ . Sebuah kotak jenis  $x$  boleh menyimpan 4 botol ubat dan jenis  $y$  boleh menyimpan 8 botol ubat.*

Manufacture of boxes based on the following constraints:

*Pembuatan kotak berdasarkan kekangan berikut::*

- I: Number of boxes built not only can save more than 200 bottles.  
*Jumlah kotak yang dibina hanya boleh meyimpan tidak lebih dari 200 botol.*
- II: Total box is made of at least 20.  
*Jumlah kotak yang di buat sekurang-kurang 20 buah.*
- III: The number of boxes of  $x$  does not exceed two times the boxes type  $y$ .  
*Bilangan kotak jenis  $x$  tidak melebihi dua kali ganda bilangan kotak jenis  $y$ .*
- (a) Write three inequalities, other than  $x \geq 0$  and  $y \geq 0$ , which satisfy all the above constraints.

*Tulis tiga ketaksamaan, selain  $x \geq 0$  dan  $y \geq 0$ , yang memenuhi semua kekangan di atas.*

[3 marks]

[3 markah]

**[Lihat Sebelah  
SULIT**

**SULIT****3472/2**

- (b) Using a scale of 4 cm to 10 boxes on the  $x$ -axis and 4 cm to 5 boxes on the  $y$ -axis, construct and shaded the region  $R$  which satisfies all of the above constraints.

*Menggunakan skala 4 cm kepada 10 buah kotak pada paksi- $x$  dan 4 cm kepada 5 buah kotak pada paksi- $y$ , bina dan lorek rantau  $R$  yang memenuhi semua kekangan di atas.*

[3 marks]

[3 markah]

- (c) If the cost of making the box of  $x$  and  $y$  each is RM 3 and RM 5, using your graph. Find

*Jika kos pembuatan kotak jenis  $x$  dan  $y$  masing-masing ialah RM 3 dan RM 5, dengan menggunakan graf anda, cari*

- (i) value of  $x$  and of  $y$  so that the manufacturing cost of the box is minimum,  
*nilai  $x$  dan nilai  $y$  supaya kos pembuatan kotak adalah minimum,*
- (ii) the minimum cost.  
*kos minimum.*

[4 marks]

[4 markah]

- 15** A particle moves along a straight line and passes through a fixed point  $O$ . Its velocity,  $v \text{ m s}^{-1}$ , is given by  $v = t^2 - 8t + 7$ , where  $t$  is the time, in seconds, after passing through  $O$ .

*Satu zarah bergerak disepanjang suatu garis lurus melalui satu titik tetap  $O$ .*

*Halajunya,  $v \text{ m s}^{-1}$ , di beri oleh  $v = t^2 - 8t + 7$ , dengan keadaan  $t$  ialah masa, dalam saat, selepas melalui  $O$ .*

[Assume motion to the right is positive]

[Anggapkan gerakan kearah kanan sebagai positif]

Find

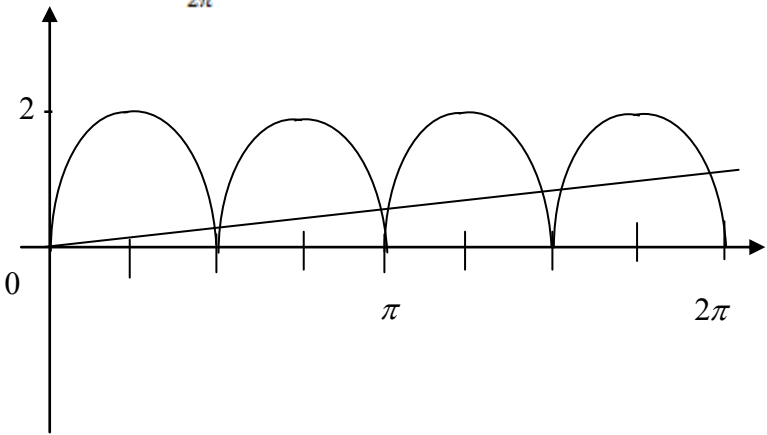
*Cari*

- (a) the initial velocity, in  $\text{m s}^{-1}$ , of the particle, [1 mark]  
*halaju awal, dalam  $\text{m s}^{-1}$ , zarah itu,* [1 markah]
- (b) the minimum velocity, in  $\text{m s}^{-1}$ , of the particle, [3 marks]  
*halaju minimum, dalam  $\text{m s}^{-1}$ , zarah itu,* [3 markah]
- (c) the time interval during which the velocity of the particle is negative. [2 marks]  
*julat masa apabila halaju zarah adalah negatif.* [2 markah]
- (b) the total distance, in m, traveled by the particle in the first 7 seconds. [4 marks]  
*jumlah jarak, dalam m, yang dilalui oleh zarah dalam 7 saat pertama.* [4 markah]

**END OF QUESTION PAPER****KERTAS SOALAN TAMAT**

**MARKING SCHEME**  
**ADDITIONAL MATHEMATICS 3472/2**  
**PKBS 3 / TRIAL SPM 2010**

NO	SOLUTIONS	MARKS	TOTAL
1	$x = \frac{8-y}{2} \quad \text{or} \quad y = 8 - 2x$ $4\left(\frac{8-y}{2}\right)^2 + 3y^2 - 52 = 0 \quad \text{or}$ $4x^2 + 3(8-2x)^2 - 52 = 0$ $(2x-5)(2x-7) = 0 \quad \text{or} \quad (y-3)(y-1) = 0$ $x_1 = \frac{5}{2}, x_2 = \frac{7}{2} \quad \text{or} \quad y_1 = 3, y_2 = 1$ $y_1 = 3, y_2 = 1 \quad \text{or} \quad x_1 = \frac{5}{2}, x_2 = \frac{7}{2}$	<p>P1</p> <p>K1</p> <p>K1</p> <p>N1(both)</p> <p>N1(both)</p>	5
2(a)	$x^2 - kx + \left(-\frac{k}{2}\right)^2 - \left(-\frac{k}{2}\right)^2 - 8$ $\left(x - \frac{k}{2}\right)^2 - \left(-\frac{k}{2}\right)^2 - 8$ $\frac{k}{2} = 1, -\left(-\frac{k}{2}\right)^2 - 8 = m$ $k = 2$ $m = -9$	<p>K1</p> <p>K1</p> <p>N1(both)</p>	6
(b)	$f(x) = (x-4)(x+2)$ $A(-2, 0)$ $B(4, 0)$	<p>K1</p> <p>N1</p> <p>N1</p>	
3(a)	$d = (6\pi + 2\pi r) - (2\pi r) = 6\pi \quad @ \quad a = 2\pi r$ $\frac{6}{2}[2(2\pi r) + (6-1)(6\pi)] = 120\pi$ $r = 2.5 \text{ cm} \quad \text{or} \quad \frac{5}{2} \text{ cm}$	<p>K1</p> <p>N1</p>	7

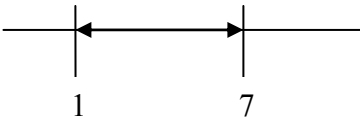
(b)	$T_6 = 2\pi(2.5) + (6-1)(6\pi)$ $= 35\pi$	K1 N1	
(c)	$\frac{n}{2}[2(2\pi(2.5)) + (n-1)(6\pi)] = 320\pi$ $3n^2 + 2n - 320 = 0$ $(3n + 32)(n - 10) = 0$ $n = 10$	K1  K1  N1	
4(a)	$L.H.S = \frac{4 \sin x}{\sec x}$ $= 4 \sin x \cos x$ $= 2 \sin 2x$	K1  N1	
(b)	$y = \frac{x}{2\pi}$  <p>The number of solution = 8</p>	K1  <i>Sine graph</i> P1 <i>Modulus/</i> <i>cycle</i> P1 <i>Straight</i> <i>line</i> K1  N1	7
5(a)	$\frac{5.5(3) + 15.5(6) + 25.5(8) + 35.5(n) + 45.5(4) + 55.5(2)}{3 + 6 + 8 + n + 4 + 2} = 28.5$	K1 K1  N1	
(b)	$20.5 + \left( \frac{\frac{30}{2} - 9}{8} \right) 10$ <p>28</p>	P1 K1  N1	6

6(a)	$\frac{1}{6}\pi @ 0.5237$ $\text{Arc of } PQ = 10\left(\frac{1}{6}\pi\right)$ $= 5.237 \text{ cm}$	P1  K1  N1	
(b)	$10+10+10\left(\frac{1}{6}\pi\right) = 5(\angle RST)$ $\angle RST = 5.047$	K1 K1  N1	8
(c)	$\frac{1}{2}(5^2)(5.047)$ $63.088 \text{ cm}^2$	K1  N1	
7(a)	$\frac{dy}{dx} = 2x$ $y - 6 = 4(x - 2)$ $y = 4x - 2$	K1  K1  N1	
(b)	$\int_0^2 x^2 + 2 dx - \left[\frac{1}{2} \times \frac{3}{2} \times 6\right]$ $= \frac{x^3}{3} + 2x \Big _0^2 - \left[\frac{1}{2} \times \frac{3}{2} \times 6\right]$ $= \frac{2^3}{3} + 2(2) - \frac{9}{2}$ $= \frac{13}{6} @ 2\frac{1}{6} @ 2.167 \text{ unit}^2$	K1 K1    N1	10
(c)	$\pi \int_2^6 (y-2) dy$ $= \pi \left[ \frac{y^2}{2} - 2y \right]_2^6$ $= \pi \left( \frac{6^2}{2} - 2(6) \right) - \left( \frac{2^2}{2} - 2(2) \right)$ $= 8\pi \text{ unit}^3$	K1  K1  K1  N1	

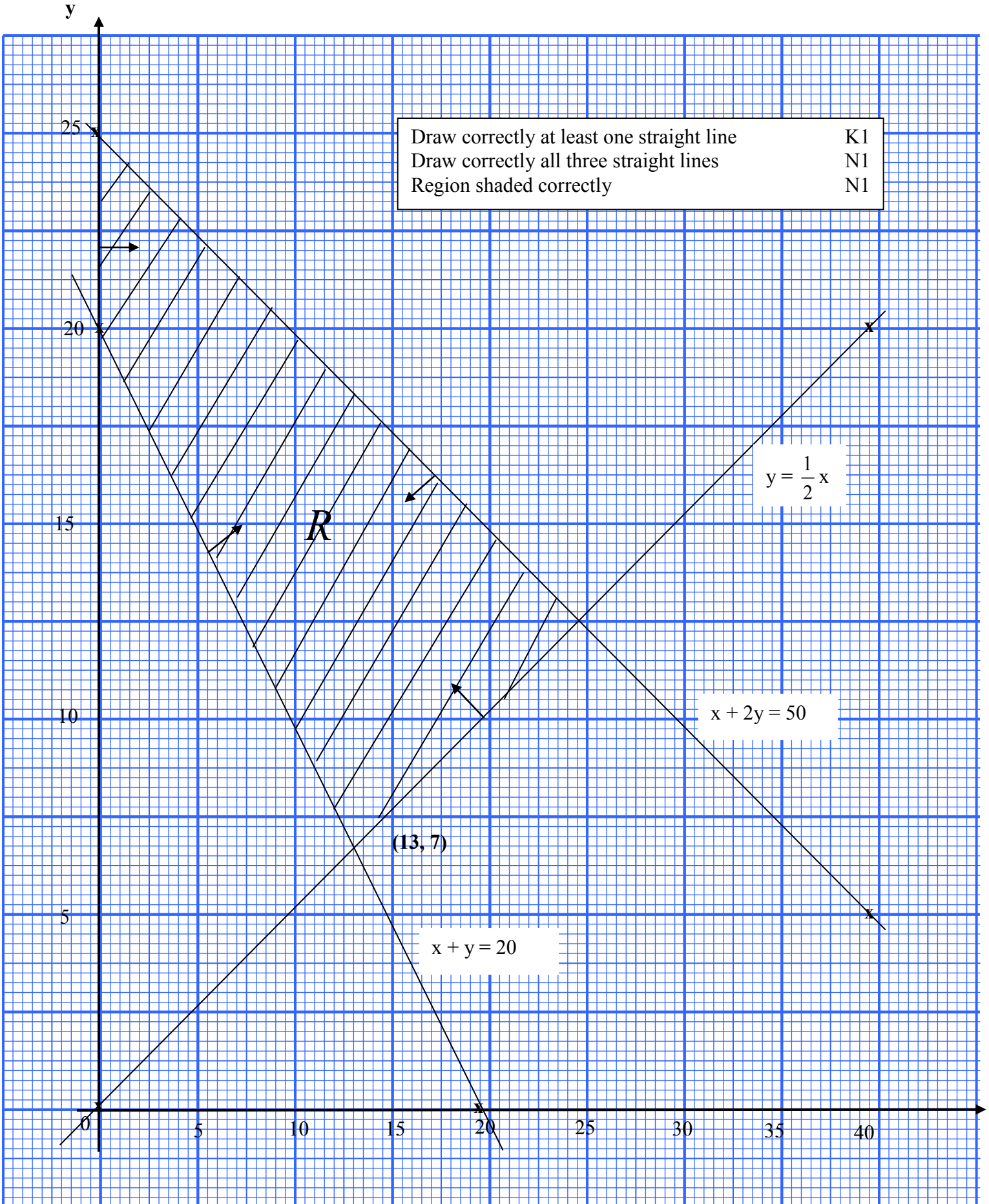
<p>9(a) (i)</p> <p>(ii)</p> <p>(b)</p>	$m_{LN} = -\frac{2}{3}$ $m_{KL} = \frac{3}{2}$ $y - 8 = \frac{3}{2}(x - 3) \quad \text{or} \quad 8 = \frac{3}{2}(3) + c$ $2y = 3x + 7 \quad \text{or equivalent}$ <p><math>K(0, \frac{7}{2})</math></p> $\frac{1}{2} \left  \left[ (9)(8) + (3)\left(\frac{7}{2}\right) \right] - \left[ \left(\frac{7}{2}\right)(9) + (4)(3) \right] \right $ $19.5 \text{ cm}^2$ $\sqrt{(x-5)^2 + (y-11)^2} = 2\sqrt{(x-9)^2 + (y-4)^2}$ $3x^2 + 3y^2 - 62x - 10y + 242 = 0$	<p>P1</p> <p>P1</p> <p>K1</p> <p>N1</p> <p>P1</p> <p>K1</p> <p>N1</p> <p>K1 K1</p> <p>N1</p>	<p>10</p>
<p>10(a)(i)</p> <p>(ii)</p> <p>(b)(i)</p> <p>(ii)</p> <p>(c)</p> <p>(d)</p>	$\overrightarrow{OS} = 10 \underline{a} + 6 \underline{b}$ $\overrightarrow{AB} = -10 \underline{a} + 8 \underline{b}$ $\overrightarrow{OR} = 10 m \underline{a} + 6 m \underline{b}$ $\overrightarrow{OR} = \overrightarrow{OB} + \overrightarrow{BR}$ $= 8 \underline{b} - n(-10 \underline{a} + 8 \underline{b})$ $= 8 \underline{b} + 10 n \underline{a} - 8 n \underline{b}$ $= 10 n \underline{a} + (8 - 8n) \underline{b}$ $10m = 10n$ $\frac{m}{n} = 1$ $ 8 \underline{b}  = 8  \underline{b}  = 8 \quad \text{or} \quad  10 \underline{a}  = 10  \underline{a}  = 20$ $\frac{1}{2} \times (8 + 6) \times 20$ $= 140$	<p>N1</p> <p>N1</p> <p>P1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>K1</p> <p>N1</p>	<p>10</p>

11(a)(i)	$p = 0.7$ $q = 0.3$ $P(X \leq 2) = {}^5C_0(0.7)^0(0.3)^5 + {}^5C_1(0.7)^1(0.3)^4 + {}^5C_2(0.7)^2(0.3)^3$ $= 0.1631$	P1 K1 N1	
(ii)	$\mu = 950(0.3)$ $= 285$	K1 N1	
(b)(i)	$P(x > 65)$ $= P\left(z > \frac{65 - 55}{4}\right)$ $= P(z > 2.5)$ $= 0.00621$	K1  N1	10
(ii)	$P(60 < x < 65)$ $= P\left(\frac{60 - 55}{4} < z < \frac{65 - 55}{4}\right)$ $= P(z > 1.25) - P(z > 2.5)$ $= 0.09939 @ 0.0994$ $\therefore 9.939\% @ 9.94\%$	K1  N1 N1	
12(a)(i)	$\frac{\sin CED}{9} = \frac{\sin 40^\circ}{6}$ $\angle CED = 74.62^\circ$ $\therefore \angle CED = 105.38^\circ$	K1  N1	
(ii)	$BD^2 = 8^2 + 6^2 - 2(8)(6)\cos 74.62^\circ$ $BD = 8.634$	K1 N1	
b(i)	$18 = \frac{1}{2}(10)(8.634)\sin ABD$ $\angle ABD = 24.64^\circ$	K1 N1	10
(ii)	$\angle BDC = 122.57^\circ - 24.64^\circ$ $= 97.93^\circ$ $Area ABCD = 18 + \frac{1}{2}(8.634)(9)\sin 97.93^\circ$ $= 56.48 \text{ unit}^2$	P1 K1 K1 N1	

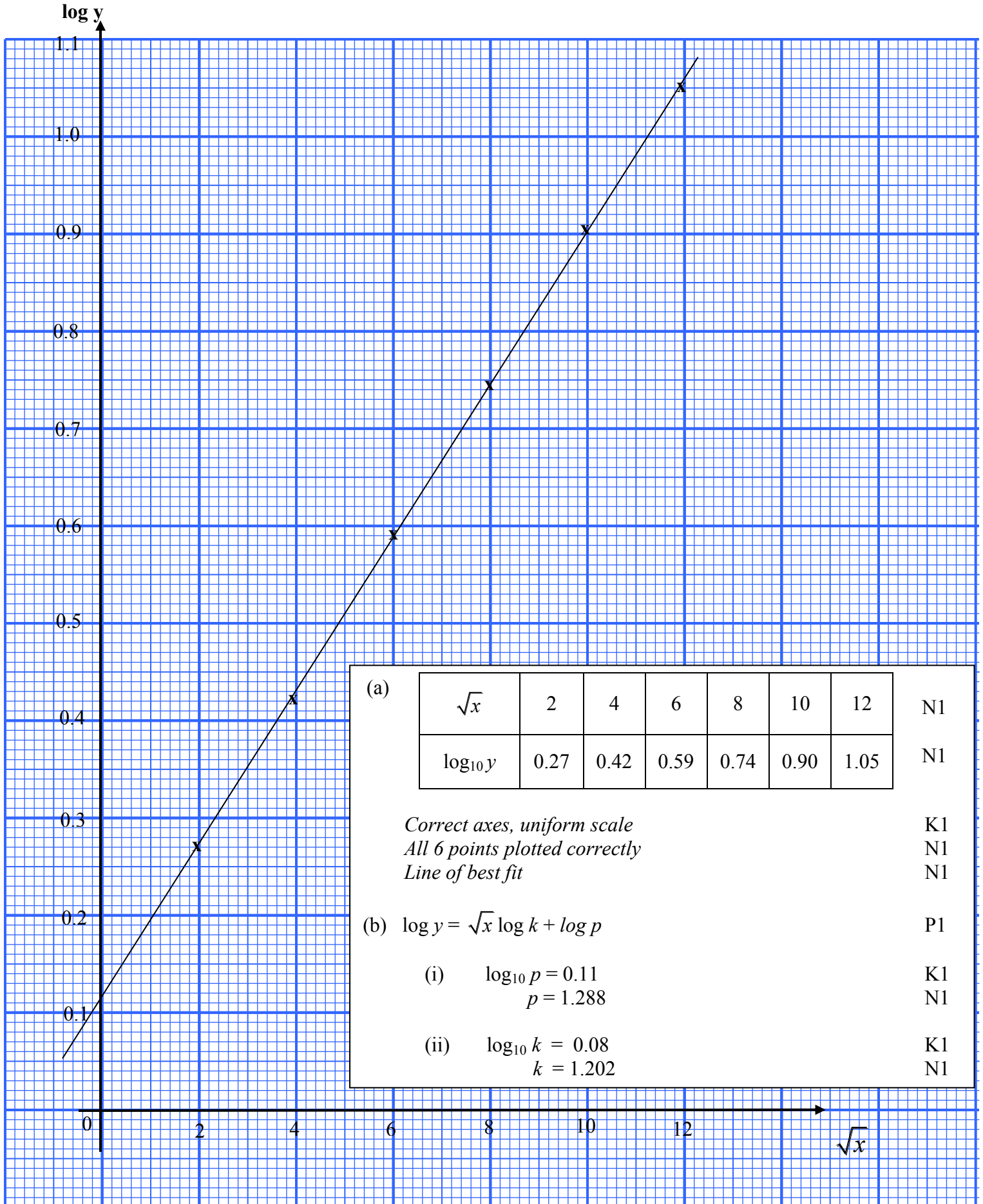
13(a)	$\frac{x}{8} \times 100 = 140$ $x = 11.20$	K1 N1	10
(b)	$\frac{180}{120} \times 100$ $= 150$ $\therefore \frac{4.50}{y} \times 100 = 150$ $y = 3$	K1 K1 N1	
(c)(i)	$122 = \frac{140(2) + 110(3) + 150(1) + (\frac{z}{2.4} \times 100)(4)}{2 + 3 + 1 + 4}$ $z = 2.76$	K1 K1 N1	
(ii)	$\frac{7.50}{H_{07}} \times 100 = 122$ $H_{07} = 6.15$	K1 N1	
14(a)(i)	<p>I : <math>4x + 8y \leq 200</math> @ <math>x + 2y \leq 50</math></p> <p>II : <math>x + y \geq 20</math></p> <p>III : <math>x \leq 2y</math> @ <math>y \geq \frac{1}{2}x</math></p>	N1 N1 N1	
(c)(i)	$x = 13$ and $y = 7$	N1	
(ii)	<p>the minimum cost, <math>k = 3x + 5y</math></p> $= 3(13) + 5(7)$ $= \text{RM } 74$	K1 K1 N1	

15(a)	$t = 0, v_0 = 7 \text{ ms}^{-1}$	P1	
(b)	$\frac{dv}{dt} = 2t - 8$ minimum velocity, $a = 0$ $2t - 8 = 0$ $t = 4$ $v_{\min} = 4^2 - 8(4) + 7$ $= -9 \text{ m s}^{-1}$	K1  K1 N1	
(c)	when $v < 0$ $t^2 - 8t + 7 < 0$ $(t - 1)(t - 7) < 0$  $1 < t < 7$	K1  N1	10
(d)	The total distance $= \int_0^1 (t^2 - 8t + 7) dt + \left  \int_1^7 (t^2 - 8t + 7) dt \right $ $= \left[ \frac{t^3}{3} - 8\frac{t^2}{2} + 7t \right]_0^1 + \left  \left[ \frac{t^3}{3} - 8\frac{t^2}{2} + 7t \right]_1^7 \right $ $= \left[ \frac{(1)^3}{3} - 4(1)^2 + 7(1) - 0 \right] + \left  \left( \frac{(7)^3}{3} - 4(7)^2 + 7(7) \right) - \left( \frac{(1)^3}{3} - 4(1)^2 + 7(1) \right) \right $ $= \frac{118}{3} @ 39\frac{1}{3} @ 39.33m$	K1  K1 K1  N1	

Q.14 (b)



Q.8



(a)

$\sqrt{x}$	2	4	6	8	10	12	N1
$\log_{10} y$	0.27	0.42	0.59	0.74	0.90	1.05	N1

*Correct axes, uniform scale* K1  
*All 6 points plotted correctly* N1  
*Line of best fit* N1

(b)  $\log y = \sqrt{x} \log k + \log p$  P1

(i)  $\log_{10} p = 0.11$  K1  
 $p = 1.288$  N1

(ii)  $\log_{10} k = 0.08$  K1  
 $k = 1.202$  N1